

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—Among the additions made during the year 1906 to the collections under the charge of the museums and lecture-rooms syndicate, special mention has been made in the forty-first annual report of the syndicate of the gift to the school of botany, by Mr. Francis Darwin, of the scientific library of his father. Dr. E. C. Stirling has presented to the museum of zoology a cast of a skeleton of the gigantic extinct marsupial *Diprotodon australis*, and the Duke of Bedford two specimens of Przewalsky's horse from the collection at Woburn Abbey. The collection of antelopes has been largely increased, principally through the donations of Mr. C. B. C. Storey, Mr. A. L. Butler, Major W. B. Emery, and Captain E. Mackenzie Murray. The executors of the late Mr. J. S. Budgett have presented a number of specimens to the museum of zoology, and certain pieces of apparatus to the zoological laboratory. The Strickland curator directs attention to the completion of the late Prof. Newton's "Ootheca Wolleyana," and to the fact that the whole of Prof. Newton's magnificent collection of palæarctic eggs becomes thereby the property of the University. Numerous anthropological gifts to the museum of human anatomy are recorded in the reports of Dr. Barclay-Smith and Dr. Duckworth.

A SUMMER school for university extension students will be held at Oxford during August. The inaugural address will be delivered in the examination schools on Thursday, August 1, at 8.30 p.m., by the Earl of Halsbury, F.R.S. The meeting will be divided into two parts, the first of which will extend from August 1 to August 14, and the second from August 15 to August 26. The lectures in the science section will be arranged with the object of illustrating the part played by Oxford in the advancement of science, particularly in the seventeenth century. Among the lecturers will be Dr. T. B. Strong, Dr. W. Osler, F.R.S., Mr. J. Wells, Dr. Brereton Baker, F.R.S., Prof. F. Gotch, F.R.S., Prof. H. H. Turner, F.R.S., Prof. E. B. Poulton, F.R.S., and Mr. J. L. Myres. There will also be special classes in practical map-making, nature-study, and principles and practice of education.

PROF. A. S. HEMMY, Government College, Lahore, writes to correct a report as to the state of science in the Punjab which appeared in the *Civil and Military Gazette*, and was summarised in NATURE of May 16 (p. 70). The local paper pointed out that comparatively few students present themselves for examinations in the science faculty of the Punjab University, and therefore suggested that scientific studies are not making much headway in India. Prof. Hemmy remarks that though the study of science in the Punjab is in a somewhat backward condition, the various laboratories being badly endowed, the article in the local paper, upon which our note was based, is misleading. The regulations of the Punjab University permit science (of a very slightly lower standard) to be taken up for the arts degree as well as for the B.Sc., and the great majority of students who take up science do so as part of the more popular B.A. course. It appears that the numbers quoted in the note only represent, therefore, a fraction of the total number studying science. For 1907, in the arts faculty, out of 3666 candidates for matriculation, 1426 took up physics and chemistry; out of 689 candidates for the intermediate, 254 took the same subject; of the 340 for the B.A., 25 took physics and 32 chemistry; while of the 52 M.A. candidates, 3 took physics and 4 chemistry.

An exhibition of selected specimens of work of pupils in the rural schools of East Suffolk was held at the County Hall, Ipswich, on June 15. The exhibition was arranged by Alderman the Rev. C. J. Steward, chairman of the Education Committee of the East Suffolk County Council, to whose energy and enthusiasm this movement owes so much. It is clear that valuable work is being done in East Suffolk schools to train observational powers and to stimulate interest in natural phenomena. Forty-three distinct exhibits were shown, including some excellent collections of the grasses and wild plants of each district,

while mounted and labelled specimens illustrating the life-history of common plants and animals, meteorological records kept and displayed in the form of charts, plans of the villages and of the school buildings, carefully selected specimens showing the structure and growth of common timber trees, plans of school gardens, records of the country month by month, and excellent studies of the changes in ditches and ponds during the year, were also shown. In addition, there were records of bee-keeping and illustrations of budding and grafting. East Suffolk has made a good start in the newer teaching, and the exhibition itself, as well as the numbers of those who attended from all parts of the county, shows that a genuine interest is being taken in the matter. A selection of the exhibits is to be sent to the Royal Agricultural Society's show at Lincoln.

A CONFERENCE will be held in Naini Tal this year, we learn from the *Pioneer* of Allahabad, for the purpose of considering many difficult questions connected with technical education, and if possible to devise some properly coordinated scheme which shall lead the way for the whole of India. In an enlightened editorial article the *Pioneer* reviews the objects the advocates of technical instruction have in view, and indicates many of the special requirements of the Indian population which must be borne in mind in devising a scheme suited to Eastern needs. It is pointed out that for the success of any system provision must be made for the different classes of workers engaged in modern productive industries, workmen or artisans, foremen or overseers, managers or masters, and that it is necessary to provide grades of technical education corresponding to primary, secondary, and university or higher education. The lowest grade is that which presents most difficulty in India. At the present time, the article states, it is impossible to give instruction in elementary science in Indian village schools, but something might be done to teach drawing and to give handicraft training by means of a form of apprenticeship to village craftsmen. It is proposed that the most promising of those so trained might then be assisted to undergo a course at an industrial school in the nearest large centre, and thus the instruction in the primary schools of the country could be brought in touch with modern needs, and a system commenced which would advance any scheme of technical education finally adopted. It is suggested that workshop practice could best be given in India in apprenticeship schools of the Continental type, and that evening classes would serve the purpose of improving the workmen and selecting those capable of profiting from a systematic course of higher study. No difficulty is anticipated so far as educating the foremen is concerned, and technical institutes of the right kind are recommended as the best way to provide higher technical education. Undoubtedly, the article continues, much has already been done in India to provide a system of technical education, and progress has been made by means of art schools, industrial schools, and engineering colleges, but there is a tendency to lose sight of modern developments, and the immediate need now is a systematic arrangement of the work at present undertaken.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, May 9.—"The Ascent of Water in Trees." (Second paper.) By Prof. A. J. Ewart. Communicated by Francis Darwin, For. Sec. R.S.

The experiments detailed or quoted tend to show that the continuous ascent of water is only possible in living wood, and that the power of conduction is rapidly lost on death, without any mechanical blocking of the vessels being necessarily responsible for the change. Hence we are forced to conclude that the living cells in tall trees continually restore the conditions for the ascent of water wherever these are affected by the excessive emptying of the vessels, and decrease the resistance to flow, as far as possible, by maintaining continuous water columns in parts at least of the wood. So long as these are present *ab initio*, a pumping action only becomes necessary in trees more than 20 to 50 metres in height, but suspended

columns cannot be maintained for any length of time in the vessels of tall trees without the aid of the living cells of the wood.

The energy required to pump water upwards in the tallest trees represents only a small fraction of that produced by the daily photosynthetic assimilation, and it is the feeble character and diffuseness of the pumping action which render it so difficult to demonstrate practically.

Experiments on the suction and exudation of trees at different levels and upon the influence of the entry of air and water under pressure showed that no continuous suspended water columns, or high internal tensions, existed in the conducting elements of the trees experimented on (maple and poplar) during active transpiration, or, indeed, at any period of the year.

The same was shown by direct measurements of the pressure in intact vessels of *Wistaria* during active transpiration. This fact, coupled with the high total resistance to flow, shows that this resistance is overcome locally from point to point, and not by any enormous tension from above or pressure from below, neither of which exists, nor could be maintained to a sufficient extent to carry on the elevation of water in a tall tree. A high tension from above leads to rapid blocking with air; a high pressure from below leads to great loss by lateral exudation from the vessels.

The surface adsorption of dissolved solids in the vessels plays a very important part in their function as translocatory channels, causing a delay in the ascent of dissolved solids, such as sugar and salts, and an accumulation of them along the outer walls of the vessels. The latter facilitates their outward diffusion, but at the same time renders the transference of small quantities of material between widely removed organs difficult or impossible.

The tallest trees in Australia do not appreciably exceed 300 feet in height, so that the values previously given for the maximal total resistance to the upward flow of sap in actively transpiring trees must be reduced to between thirty and fifty atmospheres.

May 30.—“Report of Private Expedition to Philippeville, Algeria, to View the Total Eclipse of the Sun on August 30, 1905.” By Dr. T. C. **Porter** and W. P. **Coffox**.

The two observers camped out on a hill near the village of St. Charles, in lat. $36^{\circ}45'38''$ N. and long. $6^{\circ}51'59''$ E., and 600 feet above sea-level. The line of central eclipse passed directly over their station. They had magnificent weather on the day of the eclipse, and were able to carry out almost all the observations contemplated, both visual and photographic. Two simultaneous photographs were taken of the corona through two large Nicol prisms, the axes of which made angles of 45° with the horizon, and were at right angles to each other. The negatives, and also the reproductions given in the paper, show very strikingly the radial polarisation of the outer corona; one of the streamers, for example, can be traced with certainty from within $2\frac{1}{2}$ to 2.2 diameters away from the moon's limb on one of these photos., whilst no part of it can be so traced on the other. There is unmistakable evidence in both photos. that the coronal development as a whole was more considerable on the N.E. limb of the sun, i.e. on the side where the great prominence was visible. The telescopic examination of the details of the inner corona on the N.E. limb proved exceptionally interesting, a superb radial “pillared” structure being seen, cut by the streamers at various angles, and limited externally by a very thin shell concentric with the sun, suggesting partial condensation and a possible differentiation of the “reversing layer” into concentric shells of vapours of varying condensability. Jets were also observed on the S.E. limb of a different colour from that of the prominences visible, their narrow stems being white, but passing into “rounded, soft-looking summits of the bluish-pink of the cyanogen flame.” A photograph of the “coronium ring,” taken with a specially prepared screen, revealed obvious jets, forty being easily counted on the enlarged negative, and it is shown in the paper that these must be attributed either to “coronium” itself or to some unknown element the radiation from which was capable of penetrating the screen used.

The so-called “shadow bands” were very well seen, both before and after totality, and are fully discussed in the paper. They were waved, and the waves seemed to have a motion of their own along the lines of shadow, which makes it almost certain that the true direction of travel of each band considered as a whole was *not* at right angles to its length, though at first sight the bands seemed to be so travelling. It was proved that the directions of the lengths of the bands coincided within the errors of experiment with the trace on the horizontal sheet on which they were observed of the plane passing through the cusps of the solar crescent and the sheet; the frequently observed rotation of their direction during the progress of an eclipse is accounted for. A full meteorological record was kept for a few days, both before and after the eclipse day, and the information gained is all exhibited on one chart, from which the reduced barometric height, the humidity, solar radiation, temperature of the air, direction and force of the wind, and amount and distribution of cloud, as well as its kind, can be read off for any hour of the day, and during the eclipse for every ten minutes. The total length of the certainly disturbed-barometer district at any one moment was some 5000 odd miles, the part of it *preceding* the *umbra* being some 200 miles shorter than that following it, and the barometric maximum seems to have travelled about 500 miles behind the centre of the *umbra*, and to have covered a region about the same number of miles in length, measured along the line of central totality. The eclipse wind is discussed, and seems to have been due to the inrush of air from all sides towards the centre of the shadow, the effect of this influx being superposed, at the station, on the northerly sea breeze. The direction of motion of the shadow bands had certainly a large northerly component, and thus their motion was also towards the line of central eclipse, thus following the general direction of the wind. A careful estimate of the height of the reflecting layers of matter in the earth's atmosphere, made by measuring the altitude of the orange glow seen near the horizon during central totality, gave six miles, a result coming very near the inferior limit given by many hundreds of observations in different latitudes by one of the observers.

The stars seen during totality were Venus, Mercury, Regulus, Spica, Arcturus, and Procyon.

“An Experimental Inquiry into the Nature of the Substances in Serum which influence Phagocytosis.” (Second communication.) By George **Dean**. Communicated by Dr. C. J. Martin, F.R.S.

(1) Dilution of fresh unheated serum is not accompanied, so far as the higher concentrations are concerned, by a fall in the sensitising power for certain organisms (staphylococcus, tubercle bacillus). The diminution in this was found, as a rule, to begin at the quarter concentration.

(2) So far as the present experiments go, the points corresponding to the $\frac{1}{4}$ th, $\frac{1}{8}$ th, $\frac{1}{16}$ th, and $\frac{1}{32}$ nd dilutions of normal human serum lie on a parabola the equation of which is $y^2=4X$, i.e. for these dilutions the phagocytosis is proportional to the square root of the serum concentration.

(3) The phagocytic index obtained by mixing appropriate dilutions of a heated immune serum with a normal fresh serum is greater than results from the two substances acting separately.

(4) In the case of certain normal sera (guinea-pig and rabbit) previously investigated for amboceptor and complement in relation to the extra-corporeal bacteriolysis of the typhoid bacillus (Wechsberg), an exact parallelism can be demonstrated to exist between that function and opsonisation. The normal amboceptor can be complemented by fresh serum in regard to both functions.

(5) An “anti-complement” serum, when mixed with a fresh normal serum alone or in a mixture containing heated immune serum, throws out of action the thermolabile substance, whereas it does not appear to influence the thermostable substance.

“The Correlation of the Ovarian and Uterine Functions.” By E. S. **Carmichael** and Dr. F. H. A. **Marshall**. Communicated by Prof. E. A. Schäfer, F.R.S.

(1) The removal of the ovaries in young animals (rodents) prevents the development of the uterus and Fallopian tubes.

These remain in an infantile condition. The subsequent growth and general nutrition of the animals seem to be unaffected.

(2) The removal of the ovaries in adult animals (rodents) leads to fibrous degeneration of the uterus and Fallopian tubes (most marked in the mucous membrane). The animals' subsequent health and nutrition remain good.

These observations, for the most part, support the evidence obtained clinically in the human subject after surgical operation.

(3) The removal of the uterus in a young animal has no influence in preventing the further development of the ovaries. These are capable of ovulating and forming corpora lutea after adult life has been reached.

(4) The removal of the uterus in an adult animal does not give rise to any degenerative change in the ovaries, if the vascular connections of the latter remain intact.

These latter observations do not support the contentions of those surgeons who advocate subtotal hysterectomy, believing that the functional activity of the ovary is in some way dependent on the presence of the uterus.

"On Mitosis in Proliferating Epithelium." By Dr. J. O. Wakelin **Barratt**. Communicated by Prof. C. S. Sherrington, F.R.S.

(1) In epithelial proliferation brought about by scharlach B, both normal somatic and reduced mitoses occur. This statement applies to epithelium proliferating *in situ*, and also to the same implanted under the skin.

(2) In the reduction mitoses the number of chromosomes which could be counted varied from fourteen to eighteen. In the somatic form the number counted varied from twenty-eight to thirty-six.

(3) Reduction mitoses could be recognised less frequently than somatic mitoses.

(4) Post-reduction mitoses were met with.

(5) The character of the mitoses occurring was not definitely altered by implantation under the skin.

"The Solubility of Air in Fats, and its Relation to Caisson Disease." By Dr. H. M. **Vernon**. Communicated by Dr. J. S. Haldane, F.R.S.

At body temperature, fats dissolve more than five times as much nitrogen as an equal volume of water or blood plasma.

The special tendency of the fat-containing tissues (such as subcutaneous tissues, spinal cord, and peripheral nerves) of caisson workers and divers to suffer injury from the liberation of gas bubbles after rapid decompression is dependent on this great solubility.

Geological Society, June 5.—Sir Archibald Geikie, Sec.R.S., president, in the chair.—A marine fauna in the basement beds of the Bristol coalfield: Herbert **Bolton**. During exploration at the Ashton Vale Colliery, fossiliferous shales were traversed in the lowest Coal-measures resting upon the Millstone Grit. A section of the Coal-measures in this part of the coalfield is given, and the chief fossiliferous zone is localised at a depth of 84 feet below it. The feature of the fossils is their dwarfed condition. The thickness of the Millstone Grit appears to be about 980 feet. The palæontological description embodies a list of fossils from the marine horizon, which shows correspondence with the list from the marine beds associated with the gin coal of North Staffordshire, but it is not desirable to conclude that the horizons are identical until further evidence has been obtained from the Bristol area. The brachiopod fauna contains forms identical with or closely approximating to species occurring in the Cyathaxonia and Dibunophyllum zones. The description includes notes on Productus, Chonetes, Derbya, and Orthothetes, contributed by Dr. A. Vaughan, and new species of Chonetes, Raphistoma, and Loxonema.—Brachiopod morphology: Cincta, Eudesia, and the development of ribs: S. S. **Buckman**. The test ornament of brachiopods is found in three main phases, smooth, ribbed, and spinous, and of these a costate species is more advanced than a smooth one and less advanced than a spinose one. The first phase of development dealt with may be called the lenticular stage; the next phase would be the Cincta stage, in which the front margin is rounded in youth, truncate in adolescence, incipiently excavate and bilobate in the adult. The Cincta stage may develop in

two directions—out of broad forms the quadrid stage, out of narrow forms the cornute stage. The next development may be called the quadricarinate or trigonellid stage, and the fourth stage the multicarinate or *pectunculus* stage. In Eudesia there is a highly developed multicarinate stage. In degree of ribbing it is higher than Cincta, and even higher than the *pectunculus* stage, but both the ribbing and the loop forbid connection with Cincta.

Chemical Society, June 6.—Sir William Ramsay, K.C.B., F.R.S., president, in the chair.—The relation between absorption spectra and chemical constitution, part vii., pyridine and some of its derivatives: F. **Baker** and E. C. C. **Baly**. The absorption spectra of pyridine and the pyridones are consistent with the view that the nitrogen atom tends to restrain the motions of the ring, this restraint being very much lessened by the addition of acid to the solutions.—The interaction of methylene chloride and the sodium derivative of ethyl malonate: F. **Tutin**.—The constitution of the diazo-compounds: J. C. **Cain**. The author proposes for diazo-benzene chloride the quinonoid formula, which bears much analogy to the formula of quinonechloroimide, which, like diazo-salts, loses nitrogen on boiling with water.—Dibromoaminoazobenzene: J. T. **Hewitt** and N. **Walker**.—Phenol-*p*-sulphoxide: S. **Smiles** and A. W. **Bain**.—*p*-Cresol sulphoxide and sulphide: S. **Smiles** and T. P. **Hilditch**.—Molecular weight of β -naphthol in solution in solid naphthalene: E. P. **Porman** and J. H. **Davies**. It is concluded from vapour-pressure measurements that in dilute solutions β -naphthol has the same molecular weight as in the gaseous state, whilst it associates in more concentrated solutions.—Synthesis of hexatriene derivatives. (Preliminary note): Miss I. **Smedley**.—The reduction of aromatic nitro-compounds to azoxy-derivatives in acid solution: B. **Flurscheim** and T. **Simon**. The conditions which favour or prevent the formation of azoxy-products by reduction of nitro-bodies in acid solution have been determined.—Action of selenium and tellurium on arsine and stibine: F. **Jones**. It is found that the action of arsine and stibine on sulphur, selenium, and tellurium corresponds with the rise in the atomic weights of these elements, stibine being readily decomposed by sulphur, more slowly by selenium, and still more slowly by tellurium.—The double nitrites of mercury and the alkali metals: P. C. **Rây**.—Silver-mercurous-mercuric hydroxynitrates and the isomorphous replacement of univalent mercury by silver: P. C. **Rây**.—The molecular weights of amides in various solvents: A. N. **Meldrum** and W. E. S. **Turner**.—Some experiments on the oxidising action of hydrogen peroxide: W. H. **Perkin**, jun. Benzoin, hæmatin, benzil, phenanthrenequinone, and aurin are oxidised by 30 per cent. hydrogen peroxide, yielding products which are still under investigation. Experiments are in progress with the view of determining the special conditions under which hydrogen peroxide may be employed with success in the investigation of such substances.—Action of hydroxylamine on *o*-benzoquinonediazides. 3:5-Dibromo-*o*-aziminobenzoquinone: K. J. P. **Orton**, W. C. **Evans**, and E. **Morgan**.—Oxime formation and decomposition in presence of mineral acids: A. **Lapworth**. The conversion of stable hydroximido-compounds into the corresponding ketones or aldehydes is, as a rule, to be effected by the use of hydrochloric acid in presence of formaldehyde. The latter is converted into formic acid in the process, while the nitrogen of the oxime appears mainly as ammonium chloride. When benzaldehyde is substituted for formaldehyde, benzaldoxime and sometimes benzonitrile are formed.—Note on the constituents of the seeds of the Para rubber tree (*Hevea brasiliensis*): W. R. **Dunstan**. The kernels of the seeds of the Para rubber tree contain about 50 per cent. of a fixed oil resembling linseed oil. The seed kernels, when ground with water, evolve small quantities of hydrocyanic acid and acetone, whence it appears that a cyanogenetic glucoside is present, similar to, if not identical with, phaseolunatin. A mixture of enzymes was prepared from the seeds which probably includes, besides a lipase-like enzyme, one capable of decomposing the cyanogenetic glucoside. The nature of the fixed oil, the cyanogenetic glucoside, and the enzymes is being fully investigated in this and the related species, *Hevea pauciflora* and *Hevea confusa*.

Mineralogical Society, June 11.—Prof. H. A. Miers, F.R.S., president, in the chair.—Hamlinite from the Binnenthal: H. L. **Bowman**. A mineral occurring in small brown six-sided plates in the white dolomite, to which the name bowmanite was given by Mr. Solly in 1904, is shown by analysis to be identical with hamlinite. The crystals show a division into six biaxial sectors, and are consequently pseudohexagonal.—Faceted beads of zinc: T. V. **Barker**. The president described beads of zinc deposited on crucible lids by sublimation of zinc through oxide of tin. Some of these beads are covered with brilliant facets, and present the appearance of crystals rich in faces. Mr. Barker has found that they do not lie in zones or obey the laws of distribution of ordinary crystal faces, and cannot therefore be regarded as the faces of a single crystal. There is, however, no evidence, from etching by acid, that the bead is an aggregate of crystals. The nature of these remarkable faces is difficult to understand. A bead of platinum presenting the same peculiarities was measured by the late Prof. Miller.—Chloromanganokali: Dr. H. J. **Johnston-Lavis** and L. J. **Spencer**. A preliminary account of this new Vesuvian mineral was given by Dr. Johnston-Lavis in NATURE on May 31, 1906. A new analysis of the mineral gives the formula $\text{MnCl}_2 \cdot 4\text{KCl}$. The crystals are rhombohedral with a rhombohedral angle of $57^\circ 36'$; they are optically uniaxial with very weak positive birefringence; the refractive index is 1.59 and the specific gravity 2.31.—Mr. L. J. **Spencer** exhibited a suite of beautifully crystallised minerals, presented to the British Museum by Mr. Percy C. Tarbutt, from the Rhodesia Broken Hill mines in north-western Rhodesia. In driving a tunnel through one of the kopjes, which consist mainly of cerussite and hemimorphite, a cavern containing flint implements and bones of recent mammals was encountered, and a cavity in the bone-breccia on the floor of this cave was encrusted with magnificent groups of hopeite crystals (the rare hydrous zinc phosphate discovered by Sir David Brewster in 1823). In the vicinity of the cave, crystals of another hydrous zinc phosphate were found in association with descloizite (hydrous vanadate of lead and zinc). The crystals of this new species, for which the name *tarbuttite* is proposed, are anorthic; they possess a perfect cleavage in one direction, through which emerges obliquely the acute negative bisectrix of the optic axes. Cavities in the ordinary ore are lined with large twinned crystals of water-clear cerussite, which are encrusted with small crystals of hemimorphite.—A group of quartz crystals from British Guiana was exhibited by Mr. **Anderson**, and a fine crystal of apatite by Mr. **Gordon**.

Mathematical Society, June 13.—Prof. W. Burnside, president, in the chair.—The number of representations of a number as a sum of $2r$ squares, where $2r$ does not exceed 18: Dr. J. W. L. **Glaisher**.—An extension of Eisenstein's law of reciprocity: A. E. **Western**.—Note on a special set of classes of partial differential equations of the second order: Prof. A. R. **Forsyth**.—Various extensions of Abel's lemma: Prof. T. J. I'A. **Bromwich**.—The arithmetical nature of the coefficients of linear substitutions, third paper: Prof. W. **Burnside**.—The invariants of the quintic: Dr. H. F. **Baker**.—Informal communications were made as follows:—Certain singular points of surfaces: A. B. **Basset**.—The minimum necessary postulates as to a function to be defined as analytic over a region: Prof. E. B. **Elliott**.

Royal Astronomical Society, June 14.—Mr. H. F. Newall, president, in the chair.—The inclination of binary star orbits to the Galaxy: Prof. H. H. **Turner** and T. **Lewis**.—The illumination of the field of view, and its effect on observations with a transit instrument: Sir W. **Christie** and H. **Christie**.—The spectrum of Mira Ceti, as photographed at Stonyhurst College Observatory: Rev. W. **Sidgreaves**. The photographs were taken during the late maximum, from December 1, 1906, to January 3, 1907, with a Thorp objective prism and with a Hilger compound prism. The spectra were compared with that of the star during the previous maximum of 1897–8. The absorption spectrum was substantially the same, but the bands were much weaker in 1906, quite sufficiently so to account for the very bright maximum.—The origin of

certain bands in the spectrum of sun-spots: A. **Fowler**. The bands are hazy lines, which had not hitherto been traced to their source, various experiments made in 1905–6 having given entirely negative results. The author, however, had lately found that many of the bands are part of a fluted spectrum, and can be accounted for by the presence in the umbrae of spots of a compound of magnesium and hydrogen (magnesium hydride). The identification appeared extremely probable from a comparison of visual observations, but is rendered quite certain by reference to the admirable photographs taken by Prof. Hale at the Mount Wilson Observatory. The identification supports the view that the vapours in spots are at a relatively low temperature.—Account of the instruments and work of the Mount Wilson Observatory, California: Prof. G. E. **Hale**. A large series of slides was shown on the screen, including spectroheliograph pictures of the solar surface taken in calcium and hydrogen light, comparison of which led to important conclusions as to the relative height of the flocculi. It was suggested that the areas of the flocculi should be systematically measured, and that they might furnish data for determination of the solar rotation. A series of photographic spectra of sun-spots was also shown. Prof. Hale stated that he had found that the heat of the sun caused an actual bending of the mirror employed, the front side becoming convex and the rear side concave. He proposed to obviate this disadvantage by employing mirrors of exceptional thickness, a 17-inch mirror being under construction which is as much as 13 inches thick. Other modifications in the instrumental equipment are also in progress.

PARIS.

Academy of Sciences, June 17.—M. Henri Becquerel in the chair.—The question of the origin of the lunar seas: MM. **Loewy** and **Puiseux**. The hypothesis of the formation of the lunar seas by external collisions is discussed and shown to depend upon very uncertain hypotheses, and even then is taken alone, insufficient to account for all the facts.—The usual mode of publication of equatorial observations and on a means of improving it: G. **Bigourdan**.—Further remarks on the obliteration of the pleural cavity of elephants: Alfred **Giard**. Referring to a recent note on this subject by G. Vasse, the author remarks that the mere fact of the lungs separating easily is no proof of the existence of a pleural cavity, and quotes recent observations by Schmaltz, Ruge, and Chapman to support his point.—The preparation of anhydrous lithium monoxide: M. **de Forcrand**. None of the methods previously used for preparing this substance gives a pure product. Purified lithium hydroxide, placed in a platinum or silver boat, is heated to 780°C . in a current of dry hydrogen. The conversion into Li_2O is complete in one hour.—A new method of diagnosis of tuberculosis in man by the tuberculin ophthalmo-reaction: A. **Calmette**. One drop of a sterilised 1 per cent. aqueous solution of tuberculin is placed in the eye. After five or six hours, conjunctivitis, accompanied by copious secretions, becomes apparent in the tuberculous subjects. In non-tuberculous subjects the tuberculin is without effect. The author suggests the use of this in clinical work as a means of diagnosis, as the reaction is prompt, and neither pain nor permanent ill effects result.—Observations of the Daniel comet (1907d) made with the *coudé* equatorial of the Observatory of Lyons: J. **Guillaume**.—Observations of the Giacobini comet (1907c) made with the *coudé* equatorial at the Observatory of Lyons: J. **Guillaume**. This comet is of thirteenth to fourteenth magnitude.—A new method for resolving several problems on the development of an arbitrary function in infinite series: W. **Stekloff**.—The surfaces engendered by a circular helix: M. **Barré**.—The mechanical integration of the hodograph: L. **Filloux**.—The displacement of the absorption bands of crystals under the action of variations of temperature: Jean **Becquerel**. The bands of tysonite, parisite, and monazite are all displaced in the direction of the smaller wave-lengths when the temperature is lowered; in xenotime, however, a large number of bands move in the opposite direction.—A new method for the production of flame spectra of metallic bodies: G. A. **Hemsalech** and C. **de Watteville**. The air supplied to the lower part of a Bunsen burner carries some of the metal in a fine

state of division. To produce this the air passes through a glass bulb containing two electrodes of the metal under examination. About ten powerful sparks per second, furnished by a condenser of high capacity, are allowed to pass between the two electrodes. Sufficient of the metal is removed in this way to give a flame rich in lines. The actual quantity used, however, is extremely small, and is hardly weighable after some hours' sparking. The method is therefore peculiarly adapted for studying the spectra of rare and costly metals.—Photomicrography in colour with autochrome plates by A. and L. Lumière: Ch. A. François **Franck**.—Remark relating to the detection of calcium: H. **Baubigny**. A reclamation of priority as regards the use of an ammoniacal solution of potassium ferrocyanide as a characteristic test for calcium.—The absolute atomic weight of manganese: Gustavus D. **Hinrichs**. An application of the author's method of calculation to the experimental results of Baxter and Hines. The value 54.95 found by these workers is converted into 55 exactly by these calculations.—Arsenic acid and the methylarsenic acids: E. **Baud** and A. **Astruc**. A thermochemical paper.—The action of fluorine on selenium in the presence of glass: Paul **Lebeau**. Experimental reasons are given for assuming that the substance produced by the interaction of selenium and fluorine in the presence of glass is not pure selenium hexafluoride, but a mixture of at least two substances.—The solubility of alumina in aluminium sulphide and of magnesia in sulphide of magnesium: Marcel **Houdard**. The oxides of both magnesium and aluminium have been obtained in a crystalline form when fused with the corresponding sulphide in the electric furnace.—The alloys of nickel and tin: Em. **Vigouroux**. The alloys of nickel and tin containing up to 40 per cent. of the latter metal are feebly magnetic. Under the action of nitric acid and potash a non-magnetic alloy having the composition Ni_3Sn can be isolated.—The glycol of anethol; its transformation into anisylacetone: MM. **Tiffeneau** and **Daufresne**.—A new method of ring formation of the substituted pimelic and adipic acids: H. G. **Blanc**. The acid is converted into its anhydride by treatment with acetic anhydride, and this, followed by slow distillation, gives the corresponding cyclic ketone. The yields are very good; details are given of eleven ketones prepared according to this method.—The dimagnesium compound of 1:5-dibromopentane: V. **Grignard** and G. **Vignon**. Dibromopentane readily forms a dimagnesium compound, soluble in ether. A preliminary account is given of the reactions of this substance with carbon dioxide, ethyl acetate, and diacetyl.—The application of the method of limiting densities to the liquefiable gases: Ph. A. **Guye**. The difficulty with these is the accurate evaluation of the term A'_0 , representing the deviation from Boyle's law. A linear extrapolation from densities measured at pressures between 0.5 and 1 atmosphere is not sufficiently accurate, and the three modes of parabolic extrapolation proposed by D. Berthelot do not lead to identical results. It is pointed out that, admitting the idea of a gas constant, the parabolic extrapolation will not hold good.—The cathodic phosphorescence of complex systems. The paralysing action exercised by certain exciters of the rare earth series upon others of the same series: G. **Urbain** and Clair **Seal**.—The colloidal properties of starch: E. **Fouard**.—The comparative action of extracts of barley and of malt upon the more resisting dextrins: J. **Wolff**.—The amount of oxygen in oxyhæmoglobin from the horse: MM. **Piettre** and **Vila**.—The polymorphic transformations of isomorphous mixtures of three bodies: Fred. **Wallerant**.—The inverse bundle of *Zilla macroptera*: C. **Gerber**.—The detection of invertine, sucrose, or saccharose in various organs of the vine and in some fruits: V. **Martinand**.—Protective and evasive autotomy: Henri **Piéron**.—The structure of the divided nerves in a strictly physiological evolution: N. A. **Barbieri**.—The geology of the central Sahara: R. **Chudeau**.—The presence of Carboniferous strata in the neighbourhood of Taoudeni, south-western Sahara: G. B. M. **Flamand**.—The post-helvetian eruptions anterior to the recent volcanoes in the north-west of Sardinia: M. **Deprat**.—The storm of May 22 1907, in the department of Loiret: M. **Maillard**.

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DIARY OF SOCIETIES.

THURSDAY, JUNE 27.

ROYAL SOCIETY, at 4.30.—On the Dynamical Theory of Gratings: Lord Rayleigh, O.M., F.R.S.—On the Surface Tension of Liquids Investigated by the Method of Jet Vibration: S. D. Pedersen.—Cases of Colour Blindness, No. VI. to No. XVIII., together with Eleven Selected Examples of Normal Colour Sensation: Dr. G. J. Burch, F.R.S.—On the Occurrence of Post-tetanic Tremor in Several Types of Muscles: Dr. D. F. Harris.—On the Pressure of Bile Secretion and the Mechanism of Bile Absorption in Obstruction of the Bile Duct: P. T. Herring and S. Simpson.—Further Studies of Gastrotoxic Serum (Progress Report): Dr. C. Bolton.—Observations on the Life-history of Leucocytes, Part III.: C. E. Walker.—The Annealing of Copper with Special Reference to Dilatation: Prof. T. Turner and D. M. Levy.—On a Standard of Mutual Induction: A. Campbell.—A New Current Weigher and a Determination of the E.M.F. of the Normal Weston Cadmium Cell: Prof. W. E. Ayrton, F.R.S., T. Mather, F.R.S., and F. E. Smith.—On the Velocity of the Kathode Particles emitted by Various Metals under the Influence of Röntgen Rays and its Bearing on the Theory of Atomic Disintegration: P. D. Innes.—On the Force Required to Stop a Moving Electrified Sphere: G. F. C. Searle, F.R.S.—Some Notes on Carbon at High Temperatures and Pressures: Hcn. C. A. Parsons, C.B., F.R.S.—The Hard and Soft States in Ductile Metals: G. T. Beilby, F.R.S.—Ranges and Behaviour of Rifle Projectiles in the Air: A. Mallock, F.R.S.—Experiments on a New Kathode Dark Space in Helium and Hydrogen: F. W. Aston.—Note on the Use of the Radiometer in Observing Small Gas Pressures: Sir James Dewar, F.R.S.—And other Papers.

FRIDAY, JUNE 28.

PHYSICAL SOCIETY, at 5.—Demonstration of the Uses of his Hot Wire Oscillographs and Hot Wire Wattmeters: J. T. Irwin.—Experiments on the Production of Sand Ripples on the Sea Shore: Mrs. Ayrton.—(1) A Cosine Flicker Photometer; (2) Some Phenomena in Colour Vision: J. S. Dow.—Description and Exhibition of Students' Apparatus for Measuring Permeability and Hysteresis: Prof. W. E. Ayrton and T. Mather.

WEDNESDAY, JULY 3.

BRITISH ASTRONOMICAL ASSOCIATION, at 5.

THURSDAY, JULY 4.

CHEMICAL SOCIETY, at 8.30.—Nitro and Nitrodimethyldihydroresorcin: P. Haas.—The Structure of Carbonium Salts: F. Baker.—Studies of Dynamic Isomerism, Part VI., The Influence of Impurities on the Mutarotation of Nitrocamphor: T. M. Lowry and E. H. Magson.—The Relation between Absorption Spectra and Chemical Constitution, Part VII., The Phenyl Hydrazones and Osazones of α -Diketones: E. C. Baly, W. B. Tuck, E. G. Marsden, and M. Gazdar.—Pernanganic Acid: M. M. P. Muir.

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